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Presentation title: **Electrorheological Fluid Based Force Feedback Device**

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Abstract:
Parallel to the efforts to develop fully autonomous robots, it is increasingly being realized that there are applications where it is essential to have a fully controlled robot and "feel" its operating conditions, i.e. telepresence. This trend is a result of the increasing efforts to address tasks where humans can perform significantly better but, due to associated hazards, distance, physical limitations and other causes, only robots can be employed to perform these tasks. Such robots need to be assisted by a human that remotely controls the operation. To address the goal of operating robots as human surrogates, the authors launched a study of mechanisms that provide mechanical feedback. For this purpose, electrorheological fluids (ERF) are being investigated for the potential application as miniature haptic devices. This family of electroactive fluids has the property of changing the viscosity during electrical stimulation. Consequently, ERF can be used to produce force feedback haptic devices for tele-operated control of medical and space robotic systems. Forces applied at the robot end-effector due to a compliant environment are reflected to the user using an ERF device where a change in the system viscosity will occur proportionally to the transmitted force. Analytical model and control algorithms are being developed taking into account the non-linearities of these type of devices. This paper will describe the concept and the developed mechanism of ERF based force feedback. The test process and the physical properties of this device will be described and the results of preliminary tests will be presented

Keywords:
Haptic Interfaces, Telepresence, Electroactive Polymers, Electrorhological Fluids